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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/797,513 | 03/10/2004 | Brian S. Higgins | 7340-011 | 4226 |

4678 7590 06/10/2009

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| EXAMINER | |
|---|---|
| SURETH, SARAH ELIZABETH | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 3749 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 06/10/2009 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/797,513 | HIGGINS, BRIAN S. | |
| | Examiner | Art Unit | |
| | Sarah Suereth | 3749 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *25 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *17-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/21/09*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1. Receipt of applicant's amendment filed on 02/25/09 is acknowledged..

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 17-34** are rejected under 35 U.S.C. 103(a) as being unpatentable over **U.S. Patent No. 4,375,949 to Salooja** ("Salooja") in view of **U.S. Patent No. 4,029,752 to Cahn** ("Cahn"), and further in view of **U.S. Patent No. 4,196,057 to May** ("May") (previously cited), **Altman (5,011,516), and applicant's admitted prior art.**

Salooja discloses in the specification and figures 1-10 an invention in the same field of endeavor as applicant's invention and similar to that described in applicant's claims 17-34.

In particular, in regard to at least claim 17, Salooja discloses a method of reducing the acidity (each of nitrogen oxides and sulfur trioxides, see cols. 5-7) comprising the steps of:

partially combusting the fuel in a first stage to create a reducing environment in situ (see at least col. 1, lines 50-54);

maintaining the reducing environment for a sufficient time period such that reducible acids are reduced to a predetermined level to achieve a desirable acidity concentration in the flue gas (see at least col. 1, lines 54-59 and col. 7 lines 5-20describing that the nitrogen oxides and sulfur tri-oxides are controlled to desired/predetermined levels);

combusting the remainder of the fuel and combustion intermediates in a second stage with oxidizing environment; thereby decreased the acidity of the flue gas by reducing the acid concentration of the gas (see at least col. 1, lines 60-63 and lines 29-33).

In regard to the limitation the reducible acids are reduced "by electron addition", while Salooja does disclose that the nitrogen oxides and sulfur trioxides are reduced, the reference does not appear to go into further detail as to the mechanisms of the chemical reduction, namely "by electron addition."

Cahn teaches a method of reducing sulfur oxides that is considered to be in the same field of endeavor as both applicant's invention and Salooja. Cahn describes that sulfur oxides in a process gas stream are reduced by reaction with ammonia (i.e. NH3) as a reducing agent (see at least col. 7, lines 48-52). Cahn clearly provides that sulfur trioxide is reduced in the same manner as the described processes for sulfur dioxide (see at least col. 7, lines 34-38). The examiner notes that at least ammonia (NH3) is considered to be the type of reducing radical described in applicant's specification (see specification p. 9, line 14 lists NHi). Further, the examiner also notes that Cahn also suggests that other reducing agents such as H2, CO, and CH4 (also listed in applicant's

specification) are recognized in the art as reducing radicals creating a reducing environment (see Cahn, col. 7, lines 65-68). This describes process of employing either ammonia or other above noted agent to result in the reduction of sulfur trioxide (a reducible acid) is considered to suggest the reduction by election addition described in applicant's specification and claimed in claim 17.

Returning to Salooja, while this reference provides only some detail of the reducing of sulfur trioxides through the practice of the described method, there is clear suggestion that the reduction of sulfur trioxides is recognized in the art. Accordingly, a person of ordinary skill in the art at the time the invention was made would desirably modify the process in Salooja to incorporate the reduction by electron addition suggested by Cahn to desirably produce a gas stream that has "little or no" sulfur trioxide (see at least Cahn, col. 8, lines 41-46).

Salooja and Cahn teach substantially all of the limitations of the methods recited in claims 17-23 and 25-31, with exception of the steps of adjusting the reducing environment to lower the flue acid gas dewpoint (claims 17 and 23), improving ESP function (claims 17 and 25), and measuring acid dewpoint (claim 23). These additional steps have not been identified in Salooja or Cahn.

However, In regard to claims 17 and 25, the acid of concentration of the flue gas is directly related to the acid dew point temperature of the flue gas. This is expressly noted by applicant in applicant's description of the prior art, namely "...as the SO3 concentration increases, the acid dew point temperature of the flue gas increases." (see applicant's specification, p. 1, lines 16-18). To further support this assertion the

examiner also points to May. May discloses a method which provides that "[m]easurement of dew point enables a semi-quantitative determination of the sulfur trioxide concentration in the exhaust or flue gas" (see May, col. 5, lines 30-32 and 38-42). Accordingly, a person of ordinary skill in the art would understand that reduction of the acid concentration of the flue gas necessarily results in the lowering of the acid dew point level of the flue gas. As noted above, Salooja provides for the reduction of sulfur oxides from the effluent of flue gas of a furnace to a desired level (see at least col. 1, lines 54-59 and cols. 5-7). Therefore, a person of ordinary skill in the art would reasonably understand that obtaining the reduction target of the oxides in the flue gas as specified in Salooja would necessarily result in a corresponding desired dew point level (again see at least May, col. 5, lines 38-42).

Also in regard to claims 17 and 25, it is unclear whether the Salooja apparatus includes an ESP device. However, Altman teaches that fly ash is conventionally removed from combustion gases by electrostatic precipitation (col. 1, lines 7-10). Altman also teaches that the concentration of sulfur trioxide must be controlled to optimize the performance of the ESP filter (col. 1, lines 17-21).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Salooja apparatus to include the ESP device, as Altman teaches they are conventionally used to control fly ash (col. 1, lines 7-10).

Accordingly, a person of ordinary skill in the art would understand that reduction of the acid concentration of the flue gas necessarily results in optimizing the performance of an ESP device. As noted above, Salooja provides for the reduction of

sulfur oxides from the effluent of flue gas of a furnace to a desired level (see at least col. 1, lines 54-59 and cols. 5-7). Therefore, a person of ordinary skill in the art would reasonably understand that obtaining the reduction target of the oxides in the flue gas as specified in Salooja would necessarily result in a corresponding improved performance of the ESP device (again see at least Altman, col. 1, lines 17-21).

In regard to at least claim 18 and 19, Salooja describes that a catalytic burner is supplied at least in the first stage that produces lower NOx production than conventional combustion systems (see at least col. 2, lines 7-12, col. 6, line 67 through col. 7, line 4 and col. 4, lines 31-47) and thus reasonably suggests micro-staging through the use of low-NOx burners.

In further regard to claims 18 and 19, as noted above, while the examiner considers that the operation of the catalytic burners suggests the recited micro-staging using low NOX burners, even if this is not a proper understanding, the examiner notes that applicant admits that the use of micro-staging using low-NOx burners to reduce emissions in combustion furnaces is known in the art (see admitted prior art of page 5, lines 4-18 of applications' specification). Accordingly, even if the operation of the catalytic burners of Salooja are not properly considered to be applicant's recited micro-staging using low NOx burners, a person of ordinary skill in the art would desirably seek to incorporate mircro-staging using low NOx burners in the process of Salooja in order to desirably aid in reducing NOx emissions (see admitted prior art of p. 5, lines 4-18 of applications' specification).

In regard to at least claims 20-24 and 26-31, applicant also admits that the use of macro-staging using over-fired air and used in combination with micro-staging using low NOx burners is known in the art (see admitted prior art of page 5, line 19 through page 6, line 5 of applications' specification). Accordingly, a person of ordinary skill in the art would seek to employ macro-staging using over-fired air in a combustion stage and/or in combination of micro-staging using low NOx burners to desirably achieve NOx emissions reduction (see admitted prior art of page 5, line 19 through page 6, line 5 of applications' specification). Regarding claim 24, Salooja teaches burning a "carbonaceous fuel", which is considered to suggest coal.

Regarding claims 33 and 34, Salooja teaches reducing the concentration of sulfer trioxide to 18 ppm (col. 7, line 17).

In regard to claim 25, this claim includes limitations similar to that of claim 17 with the additional method step of "measuring the acid dewpoint of the flue gas." Salooja possibly does not expressly disclose actively measuring the acid dewpoint of the flue gas.

However, May, as previously noted, clearly provides that the dew point of the exhaust gas is measured to determine a concentration of sulfur trioxide (see May, col. 5, lines 30-32). Further, May provides that the measurement of the dew point also allows for determination of "cold end" corrosion locations (May, col. 5, lines 32-34) and further that the inherent corrosion rate measurement that arises form the dewpoint measurement "indicates the degree of inhibition of an additive such as magnesium and the actual condition at the surface." (May, col. 5, lines 34-37).

Accordingly, a person of ordinary skill in the art would desirably modify the method of Salooja to incorporate measuring the acid dewpoint of the flue gas as taught in May to determine the level of corrosion that results from the additives in the flue gas (see May, col. 5, lines 30-37).

***Response to Arguments***

4. Applicant's arguments with respect to claims 17-34 have been considered but are not persuasive.

5. Applicant argues that Salooja teaches away from the claimed invention. Applicant has quoted col. 3 lines 26-31. The examiner interprets that passage to say that an increase in the levels of $SO_2$ results in a higher dew point temperature than similar operation with lower levels of $SO_2$. However, Salooja does not appear to be comparing the dew point temperature of the acid to the temperature of the flue gas. It is well known in the art that the dew point of the acid must remain higher than the flu gas, or else the acid condenses and forms acid rain. Salooja states explicitly that the apparatus operates to perform reduction of $SO_3$ without the risk of sulphuric acid corrosion (col. 9 lines 1-4). If applicant's interpretation of the Salooja reference was correct, there would be substantial sulphuric acid corrosion due to condensing of the $SO_3$.

***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarah Suereth whose telephone number is (571)272-9061. The examiner can normally be reached on Mondays & Tuesdays 8:00AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven McAllister, can be reached (571) 272-6785. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sarah Suereth/
Examiner, Art Unit 3749

/Steven B. McAllister/
Supervisory Patent Examiner, Art Unit 3749

| FORM PTO-1449 | U.S. DEPARTMENT OF COMMERCE<br>PATENT AND TRADEMARK OFFICE | ATTY DKT NO.<br>7340-011 | SERIAL NO.<br>10/797,513 |
|---|---|---|---|
| | | APPLICANT<br>Higgins | |
| | INFORMATION DISCLOSURE<br>STATEMENT BY APPLICANT | FILING DATE<br>March 10, 2004 | GROUP<br>3749 |

**U.S. PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NO. | DATE | NAME | CL. | SUBCL. | FILING DATE IF APPROP. |
|---|---|---|---|---|---|---|---|
| | A | 3,105,540 | 10/1963 | Hardgrove | 431 | 9 | |
| | B | 3,528,797 | 09/1970 | Funk, et al. | 71 | 39 | |
| | C | 3,565,757 | 02/1971 | Warshaw, et al. | 23 | 2 | |
| | D | 3,773,897 | 11/1973 | Fields, et al. | 423 | 235 | |
| | E | 3,847,564 | 11/1974 | Marion et al. | 48 | 95 | |
| | F | 3,860,384 | 01/1975 | Vulliet et al. | 41 | 4 | |
| | G | 3,900,554 | 08/1975 | Lyon | 423 | 235 | |
| | H | 3,970,739 | 07/1976 | Shiraishi et al. | 423 | 23 S | |
| | I | 4,021,188 | 05/1977 | Yamagishi et al. | 431 | 158 | |
| | J | 4,029,752 | 06/1997 | Cahn | 423 | 563 | |

**FOREIGN PATENT DOCUMENTS**

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**OTHER DOCUMENTS (Incl. Author, Title, Date, Pertinent pages, etc.)**

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| EXAMINER | /Sarah Suereth/ (06/07/2009) | DATE CONSIDERED |
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EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /SS/ (06/07/2009)

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|---|---|---|---|---|---|---|---|
| | K | 4,039,446 | 08/1997 | Ban et al. | 210 | 688 | |
| | L | 4,080,423 | 03/1978 | Smith et al. | 423 | 210 | |
| | M | 4,089,639 | 05/1978 | Reed et al. | 431 | 211 | |
| | N | 4,119,702 | 10/1978 | Anuhata et al. | 423 | 235 | |
| | O | 4,150,631 | 04/1979 | Frey et al. | 110 | 186 | |
| | P | 4,154,581 | 05/1979 | Nack et al. | 48 | 197R | |
| | Q | 4,173,454 | 11/1979 | Heins | 44 | 522 | |
| | R | 4,196,057 | 04/1980 | May et al. | 205 | 775.5 | |
| | S | 4,208,386 | 06/1980 | Arand et al. | 423 | 235 | |
| | T | 4,213,944 | 07/1980 | Azuhata et al. | 423 | 235 | |
| | U | 4,294,178 | 10/1981 | Borio et al. | 110 | 347 | |
| | V | 4,318,718 | 03/1993 | Carver et al. | 110 | 347 | |

**FOREIGN PATENT DOCUMENTS**

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|---|---|---|---|---|---|---|---|
| | W | 4,325,924 | 04/1982 | Arand et al. | 423 | 235 | |
| | X | 4,375,949 | 03/1983 | Salooja | 431 | 7 | |
| | Y | 4,381,718 | 05/1993 | Carver et al. | 110 | 347 | |
| | Z | 4,469,050 | 09/1984 | Korenberg | 122 | 4D | |
| | AA | 4,502,633 | 03/1985 | Saxon | 239 | 422 | |
| | BB | 4,504,211 | 03/1985 | Beardmore | 44 | 604 | |
| | CC | 4,506,608 | 03/1985 | Strohmeyer, Jr. | 110 | 245 | |
| | DD | 4,507,075 | 03/1985 | Buss et al. | 431 | 115 | |
| | EE | 4,507,269 | 03/1985 | Dean et al. | 423 | 235 | |
| | FF | 4,565,137 | 01/1986 | Wright | 110 | 264 | |

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|---|---|---|---|---|---|---|---|
| | GG | 4,584,948 | 04/1986 | Syred et al. | 110 | 264 | |
| | HH | 4,624,840 | 11/1986 | Dean et al. | 423 | 235 | |
| | II | 4,627,965 | 12/1986 | Hegemann et al. | 423 | 242 | |
| | JJ | 4,672,900 | 06/1987 | Santalla et al. | 431 | 9 | |
| | KK | 4,704,084 | 11/1987 | Liu et al. | 431 | 7 | |
| | LL | 4,751,065 | 06/1998 | Bowers | 423 | 235 | |
| | MM | 4,777,024 | 10/1988 | Epperly et al. | 423 | 235 | |
| | NN | 4,780,289 | 10/1988 | Epperly et al. | 423 | 235 | |
| | OO | 4,809,910 | 09/1998 | Svendssen | 110 | 235 | |
| | PP | 4,824,441 | 04/1989 | Kindig | 44 | 604 | |
| | QQ | 4,842,834 | 06/1989 | Burton | 423 | 235 | |
| | RR | 4,873,930 | 10/1989 | Egnese et al. | 110 | 345 | |

**FOREIGN PATENT DOCUMENTS**

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|---|---|---|---|---|---|---|---|
| | SS | 4,915,036 | 04/1990 | DeVita | 110 | 215 | |
| | TT | 4,927,612 | 05/1990 | Bowers | 423 | 235 | |
| | UU | 4,926,711 | 10/1990 | Yamauchi et al. | 110 | 347 | |
| | VV | 4,978,514 | 12/1990 | Hofmann et al. | 423 | 235 | |
| | WW | 4,985,218 | 01/1991 | DeVita | 423 | 235 | |
| | XX | 4,992,249 | 02/1991 | Bowers | 423 | 235 | |
| | YY | 5,017,347 | 05/1991 | Epperly et al. | 423 | 235 | |
| | ZZ | 5,032,154 | 07/1991 | Wright | 422 | 109 | |
| | AAA | 5,048,432 | 09/1991 | Hogmann | 110 | 345 | |
| | BBB | 5,052,921 | 10/1991 | Hemsath | 423 | 121 | |

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(Form PTO-1449)

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| FORM PTO-1449 | U.S. DEPARTMENT OF COMMERCE<br>PATENT AND TRADEMARK OFFICE | ATTY DKT NO.<br>7340-011 | SERIAL NO.<br>10/797,513 |
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| | | APPLICANT<br>Higgins | |
| | INFORMATION DISCLOSURE<br>STATEMENT BY APPLICANT | FILING DATE<br>March 10, 2004 | GROUP<br>3749 |

**U.S. PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NO. | DATE | NAME | CL. | SUBCL. | FILING DATE IF APPROP. |
|---|---|---|---|---|---|---|---|
| | CCC | 5,057,293 | 05/1990 | Epperly, et al. | 423 | 235 | |
| | DDD | 5,105,747 | 04/1992 | Khinkis et al. | 110 | 345 | |
| | EEE | 5,139,754 | 08/1992 | Luftglass et al. | 423 | 235 | |
| | FFF | 5,146,858 | 09/1992 | Tokuda et al. | 110 | 261 | |
| | GGG | 5,240,404 | 08/1993 | Hemsath et al. | 431 | 9 | |
| | HHH | 5,261,602 | 11/1993 | Brent et al. | 239 | 132.3 | |
| | III | 5,286,467 | 02/1994 | Sun et al. | 423 | 239.1 | |
| | JJJ | 5,310,334 | 05/1994 | Sprios | 431 | 5 | |
| | KKK | 5,336,081 | 08/1994 | Saito et al. | 431 | 190 | |
| | LLL | 5,342,592 | 08/1994 | Hoblyn et al. | 423 | 235 | |
| | MMM | 5,345,883 | 09/1994 | Panos | 110 | 345 | |
| | NNN | 5,536,482 | 07/1996 | Diep et al. | 423 | 235 | |

**FOREIGN PATENT DOCUMENTS**

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**OTHER DOCUMENTS (Incl. Author, Title, Date, Pertinent pages, etc.)**

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**U.S. PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NO. | DATE | NAME | CL. | SUBCL. | FILING DATE IF APPROP. |
|---|---|---|---|---|---|---|---|
| | OOO | 5,489,419 | 02/1996 | Diep et al. | 423 | 235 | |
| | PPP | 5,585,081 | 12/1996 | Chu et al. | 423 | 239.1 | |
| | QQQ | 5,690,039 | 11/1997 | Monroe et al. | 110 | 264 | |
| | RRR | 5,707,596 | 01/1998 | Lewandowski et al. | 423 | 235 | |
| | SSS | 5,728,357 | 03/1998 | von Harpe | 423 | 239.1 | |
| | TTT | 5,809,910 | 09/1998 | Svendssen | 110 | 235 | |
| | UUU | 5,853,684 | 12/1996 | Fang et al. | 423 | 239.1 | |
| | VVV | 5,854,173 | 12/1998 | Chang et al. | 502 | 417 | |
| | WWW | 6,019,068 | 02/2000 | Tsuo et al. | 122 | 4D | |
| | XXX | 6,042,371 | 03/2000 | Mitani et al. | 431 | 215 | |

**FOREIGN PATENT DOCUMENTS**

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**U.S. PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NO. | DATE | NAME | CL. | SUBCL. | FILING DATE IF APPROP. |
|---|---|---|---|---|---|---|---|
| | TTT | 6,109,911 | 08/2000 | Tamminen et al. | 431 | 4 | |
| | UUU | 6,190,628 | 02/2001 | Carter | 422 | 168 | |
| | VVV | 6,213,032 | 04/2001 | Breen et al. | 110 | 345 | |
| | WWW | 6,230,664 | 05/2001 | Janka et al. | 122 | 4D | |
| | XXX | 6,280,695 | 08/2001 | Lissiamski et al. | 423 | 239.1 | |
| | YYY | 6,315,555 | 11/2001 | Salzsieder e al. | 431 | 183 | |
| | ZZZ | 6,357,367 | 03/2002 | Breen et al. | 110 | 345 | |
| | AAAA | 6,398,039 | 06/2002 | Xue et al. | 210 | 504 | |
| | BBBB | 6,485,289 | 11/2002 | Kelly et al. | 431 | 4 | |
| | CCCC | 6,527,828 | 03/2003 | Flippo et al. | 95 | 54 | |
| | DDDD | 6,532,905 | 03/2003 | Belin et al. | 122 | 4D | |
| | EEEE | 6,818,043 | 11/2004 | Change et al. | 95 | 37 | |

**FOREIGN PATENT DOCUMENTS**

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**U.S. PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NO. | DATE | NAME | CL. | SUBCL. | FILING DATE IF APPROP. |
|---|---|---|---|---|---|---|---|
| | FFFF | 7,198,769 | 04/2007 | Cichanowicz | 423 | 239.1 | |
| | GGGG | 7,335,014 | 02/2008 | Higgins | 431 | 4 | |
| | HHHH | 2003/0011948 | 06/2003 | Gaita et al. | 96 | 108 | |
| | IIII | 2004/0045437 | 03/2004 | Chang et al. | 095 | 134 | |
| | JJJJ | 2004/0120872 | 06/2004 | Fan et al. | 423 | 239.1 | |
| | KKKK | 2004/0185399 | 09/2004 | Moberg | 431 | 4 | |
| | LLLL | 2004/0185402 | 09/2004 | Moberg | 431 | 9 | |
| | MMMM | 2004/0185401 | 09/2004 | Moberg | 431 | 9 | |
| | OOOO | 2004/0253161 | 12/2004 | Higgins | 423 | 235 | |
| | PPPP | 2005/0000901 | 01/2005 | Campbell et al. | 210 | 660 | |

**FOREIGN PATENT DOCUMENTS**

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| EXAMINER INITIAL | | DOCUMENT NO. | DATE | NAME | CL. | SUBCL. | FILING DATE IF APPROP. |
|---|---|---|---|---|---|---|---|
| | QQQQ | 2005/0002841 | 01/2005 | Moberg | 423 | 235 | |
| | RRRR | 2005/0013755 | 01/2005 | Higgins | 423 | 235 | |
| | SSSS | 6,953,494 | 10/2005 | Nelson, Jr. | 95 | 134 | |
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|---|---|---|---|---|---|---|---|---|
| | | | | | | | YES | NO |
| | TTTT | DE 28 37 156 | 03/1979 | Germany (See US 5,146,858) | | | | |
| | UUUU | WO/87/03507 | 06/1987 | WIPO | | | X | |
| | VVVV | WO/05/079305 | 08/1999 | EPO | | | X | |
| | WWW W | EP 0 287 224 | 10/1998 | EPO | | | X | |
| | XXXX | EP 0936405 | 08/1999 | EPO | | | X | |
| | YYYY | EP 0 326 943 | 01/1989 | EPO | | | X | |
| | ZZZZ | GN 2 001 419 | 07/1978 | UK | | | X | |
| | AAAAA | JP 53-112273 | 09/1978 | Japan (See US 5,797,596) | | | | |
| | BBBBB | JP 2003 31322 | 01/2003 | Japan | | | | |
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| | | APPLICANT Higgins | |
| | INFORMATION DISCLOSURE STATEMENT BY APPLICANT | FILING DATE March 10, 2004 | GROUP 3749 |

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**OTHER DOCUMENTS (Incl. Author, Title, Date, Pertinent pages, etc.)**

| | | |
|---|---|---|
| | CCCCC | Energy efficiency-our specialty-by Mobotec; undated related technology |
| | DDDDD | Combined DeNox/DeSox and additional NOx Reduction by Cleaning Flue Gas Condensate from Ammonia, Moberg, et al, presentation at PowerGen Intl. 11/30-12/2/99 |
| | EEEEE | RJM-LT, "Does This New NOx Control Technology Obsolete SCRs?"; RMJ Corp., undated related technology |

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